REMARKS/ARGUMENTS

Favorable consideration of this application in light of the following discussion is respectfully requested.

Claims 1, 3-11, 13-18, 20-25, and 27-30 are pending in the application, with Claims 2, 12, 19 and 26 cancelled and Claims 1, 11, 18, 20 and 25 amended by the present amendment.

In the outstanding Office Action, the drawings were objected to; Claims 1-6, 10-16 and 18-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lahat et al. (U.S. Patent No. 6,233,074, hereinafter Lahat) in view of Chin et al. (U.S. Patent No. 6,314,110, hereinafter Chin); and Claims 7-9 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lahat in view of Chin and Graves et al. (U.S. Patent No. 6,229,788, hereinafter Graves).

The specification is amended without the introduction of new matter. Claims 1, 11, 18 and 25 are amended to recite the features of cancelled Claims 2, 12, 19 and 26 and to more clearly describe and distinctly claim Applicants' invention. Support for amended Claims 1, 11, 18 and 25 is found in Applicants' originally filed specification.[1] No new matter is added.

Applicants traverse the objection to the drawings and note that each block of Figure 5 is labeled or is supported by indicia with lead lines.

Briefly recapitulating, amended Claim 1 is directed to a metropolitan area packet rings including a) a fiber optic loop carrying asynchronous data packets, wherein the asynchronous data packets flow in a single direction through the fiber optic loop; and b) a plurality of metropolitan packet switches coupled to the fiber optic loop. A metropolitan packet switch includes c) an I/O port coupled to the fiber optic loop which inserts packets of data onto the fiber optic loop and which pulls packets of data off the fiber optic loop; and d) a processor coupled to the I/O Port which separately regulates data packets transmitted over the

[1] Specification, page 17, line 19 – page 21, line 7; Figures 4-5.

fiber optic loop on a per-flow basis, wherein quality of service is maintained on said per-flow basis. Claims 11, 18 and 25 are directed to alternative embodiments of Applicants' invention. Applicants claimed invention allows for flow-specific bandwidth and QOS control.

Lahat describes an optical add drop module (OADM) configured to enable the construction of ring networks. WDM is utilized to construct a ring type network suitable for use in both WAN and LAN environments. The network is constructed having a ring topology with a plurality of nodes connected around the ring in daisy chain fashion. Direct connections between any two end users can be established to permit unicast connections. Multicast connections are also possible from a source to several destinations. Each unicast or multicast connection between nodes utilizes a separate specific wavelength. Devices are connected to the ring network via an optical add drop module. Wavelengths pass optically through the OADM device on nodes that are intermediary to the two end nodes on either side of the connection. Only the two end nodes transmit or pickup the optical signals on that particular wavelength corresponding to the connection. Capacity in the network is easily increased by adding more optical channels on the fiber, with each channel comprising a different wavelength.[2]

Figure 5 of Lahat shows a plurality of nodes 102 on a ring 104. Each node includes a OADM to connect edge or core ATM devices to the ring.[3] However, as noted in the Official Action, Lahat does not disclose or suggest maintaining a level of QoS. Indeed, Lahat does not disclose or suggest a processor coupled to the I/O Port which separately regulates data packets transmitted over the fiber optic loop on a per-flow basis, wherein quality of service is maintained on said per-flow basis.

[2] Lahat, abstract.
[3] Lahat, column 8. lines 21-43.

As noted in Applicants' originally filed specification, a flow is stream of data between a specific sender and receiver. In Applicants' claimed invention, this stream is dynamically regulated on a per flow basis ("separately regulates data packets transmitted over the fiber optic loop on a per-flow basis, wherein quality of service is maintained on said per-flow basis"). Indeed, as recited in Applicants' specification

> In the present invention, data packets are transmitted and received over the MPTR asynchronously. In other words, users transmit and receive data packets without being synchronized with their counterparts. This means that the present invention eliminates the need for implementing expensive timing circuits and adhering to strict synchronization schedules. Instead of using synchronization or TDM to achieve QoS, the present invention provides QoS by regulating which packets from an MPS are allowed onto a loop and regulating the rate at which these packets are allowed to be put onto a loop. Once data packets are put on the loop, they are sent through the loop at maximum speed. Given that a loop has a maximum bandwidth, users are prioritized according to their QoS level such that the packets from users with higher priority get put on the loop ahead of other users' packets. Suppose that there is one user who pays for a higher level of service. The MPS is programmed by the RMS to give higher priority to that specific user. Thereby, all packets transmitted by that particular user are immediately put onto the loop and sent on their way. If the loop happens to be congested at that particular instant, packets from other users are temporarily stored in a small buffer and transmitted at a later time, as bandwidth permits. In other words, lower priority packets are temporarily held up by the MPS to be transmitted at a later time as bandwidth becomes available.
>
> Furthermore, because data packets are transmitted asynchronously through the MPTR, unused bandwidth can be allocated to active users. In a TDM scheme, time slots are reserved for specific users. If a particular time slot is not used because its user is not active at that particular instant in time, the time slot is wasted. In contrast, the present invention allocates virtually the entire bandwidth of a loop to existing, active users. When a flow stops transmitting/ receiving data packets, the amount of bandwidth available over the loop increases. This available bandwidth can be assigned to other flows which are currently active on that loop by the MPS. The MPS constantly monitors the congestion on its loop segment and assigns unused bandwidth to be allocated amongst active upstream flows according to a pre-specified weighted scheme. Thereby, with the present invention, the entire bandwidth for each of the loops is most efficiently utilized all the time.

Lahat on the other hand, is merely a switch. Lahat describes "When an edge device connected to node 3 wants to communicate with an edge device connected to node 7, a channel is

established whereby a particular wavelength is assigned to the connection. Data is transmitted on the channel using the assigned wavelength. The optical signal having this wavelength passes through all the intermediary nodes connected on the ring network that are not configured to `hear` that particular wavelength. Only node 7 is configured to listen to that particular wavelength and receive the information to be passed on to the edge device connected to node 7."[4] Lahat also describes corresponding drop and multicast functionality. But, Lahat fails to disclose or suggest any dynamic per-flow processing beyond the mere assignment of bandwidth, let alone Applicants' claimed ""separately regulates data packets transmitted over the fiber optic loop on a per-flow basis, wherein quality of service is maintained on said per-flow basis".

Chin describes system and method for locally determining a fair allocated bandwidth for a network node configured to send and receive packets in an upstream direction and a downstream direction is disclosed. A local allocated bandwidth is allocated for locally generated network packets sent in the downstream direction. A minimum downstream available network bandwidth is determined from information received in the upstream direction. The local allocated bandwidth is adjusted based on the minimum downstream available network bandwidth and the local allocated bandwidth is used to govern whether a class of locally generated network packets are sent in the downstream direction.[5]

However, like Lahat, Chin does not disclose or suggest dynamically controlling QOS on a per-flow basis. That is, in Chin, Each node determines independently how much of the ring bandwidth it should use for transmitting its own data. Each node makes its determination based on traffic received and reports of available bandwidth sent to it from other nodes on the ring network. In one embodiment implemented on a bi-directional ring, reports of available

[4] Lahat, column 8, lines 44-54.
[5] Chin, abstract.

bandwidth at other nodes are sent "upstream" in the direction opposite from the "downstream" direction that data is traveling. Network nodes evaluate how much of the network bandwidth is available to it for transmitting data and then send a message to other nodes on the network, notifying them how much bandwidth is available. Each node evaluates the amount of bandwidth that it is using compared to the minimum bandwidth that is available to other nodes on the network based on the notifications it receives. If a node is using an unfairly large amount of bandwidth, then it decreases its usage until a fair result is reached.[6] But, Chin only provides "gross" control, not "fine control" of bandwidth as is possible with Applicants' claimed invention. That is, in Chin, the nodes do not "separately regulate[] data packets transmitted over the fiber optic loop on a per-flow basis, wherein quality of service is maintained on said per-flow basis." In Chin, the bandwidth of all flows in a single node are increased or decreased in view of changing conditions whereas in Applicants' claimed invention, flows are selectively increased or decreased in view of changing conditions.

MPEP §706.02(j) notes that to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Also, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Without addressing the first two prongs of the test of obviousness, Applicants submit that the Official Action does not present a *prima facie* case of

[6] Chin, column 3, lines 15-34.

obviousness because both Lahat and Chin fail to disclose all the features of Applicants' claimed invention.

Accordingly, in view of the present amendment and in light of the previous discussion, Applicants respectfully submit that the present application is in condition for allowance and respectfully request an early and favorable action to that effect.

Respectfully submitted,

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